Shaughnessy No.: 035506

Date Out of EAB: FEB 3 1988

To: Mark Boodee
Review Manager
Special Review Branch
Registration Division (TS-676-C)

From: Frank L. Davido, Chief FLD
Field Studies and Special Projects Section #5
Exposure Assessment Branch
Hazard Evaluation Division (TS-769-C)

Thru: Paul F. Schuda, Chief
Exposure Assessment Branch
Hazard Evaluation Division (TS-769-C) Paul F. Schuda

Attached, please find the EAB review of:

Reg./File # : 179251

Chemical Name: Linuron

Type Product : Herbicide

Product Name : Lorox L

Company Name : E. I. du Pont de Nemours & Co.

Purpose : Exposure study of hand harvested potatoes, submitted by DuPont in support of the registration of Linuron.

Date Received: 8/22/86 Action Code: 827

Date Completed: 2/ 2/88 EAB #(s): 60818-9

Monitoring study requested: no Total Reviewing Time: 24 hrs

Monitoring study voluntarily: no

Deferrals to:

NA Ecological Effects Branch

NA Residue Chemistry Branch

YES Toxicology Branch

REVIEW OF REENTRY DATA

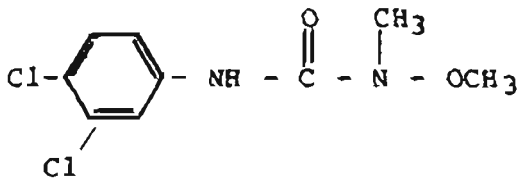
1. CHEMICAL:

Common name: Linuron

Product name: Lorox L

Chemical name: 3-(3,4-Dichlorophenyl)-1-methoxy-1-methylurea

Structure:



Other names: Afalon, Hoe 2810, Linex 4L, Linorox, Lorox, Linurex, Premalin

2. TEST MATERIAL:

Soil, chambray patches, denim patches, dH_2O handrinses, facial swabs, cotton gloves, chromatography paper.

3. STUDY/ACTION TYPE:

Review of industry supplied field exposure study.

4. STUDY IDENTIFICATION:

Confidential "Field Study Assessing Exposure of Workers Who Hand-Harvested Potatoes Treated with Linuron Herbicide" completed by Orius Associates, Inc., June 26, 1986; and submitted by DuPont, Agricultural Chemicals Department to the Office of Pesticide Programs shortly thereafter.

Reg. File Nos. 035506
Accession No. 264284
Record Nos. 179251

5. REVIEWED BY:

Hale Vandermer, PhD
Review Section #5
Exposure Assessment Branch

Hale Vandermer

2/2/1988

6. APPROVED BY:

James D. Adams, Chemist
Review Section #5
Exposure Assessment Branch, HED (TS-769)

James D. Adams

2/2/1988

7. CONCLUSIONS:

When linuron is applied to potatoes at the rate of 2.0 lbs. ai/acre at planting time very little exposure of handharvesters to the linuron residues during a hand harvesting operation can be expected. No linuron passed through the denim or chambray clothing to the skin, some passed through the cotton work gloves to the hands.

The rates of hand exposure were estimated to be 2.07 ug/hour. The total of the facial [3.2 ug/hour] and the hand exposure [2.07 ug/hour] levels is 5.27 ug/hour with inhalation and body exposures at undetectable levels. This would be equivalent to 0.84 ug/Kg/day [5.27 x 8/50] for a 50 Kg [110 lb] child working 8 hours per day.

Good laboratory and field practices were observed; the appropriate quality control measures were employed; the study was conducted in accordance with the suggestions of Subdivision K of the Pesticide Assessment Guidelines, and the data is acceptable.

8. RECOMMENDATIONS:

At the low micro gram levels of exposure to linuron observed in this study, and given the fact that linuron is classed in acute toxicity category 3, it would appear that there is no need to restrict exposure to this material in any way other than to observe good hygiene and avoid unnecessary exposures. However, since linuron has been reported to be a class C carcinogen (it caused benign tumors in rats and mice), I must defer to the Toxicology Branch for their recommendation regarding risk from carcinogenicity.

9. BACKGROUND:

The Registration Standard for linuron on 6/29/84 required the submission of reentry data. Subsequent to a meeting of Dupont representatives, Carolyn Offutt of EAB/HED, and others; it was recommended that reentry-data requirements should be waived for all uses of linuron except on potatoes provided that the label would be changed to only allow machine harvesting of asparagus. That recommendation was based on the Dupont representatives' comments that it would be preferable to the Registrant to change the label rather than gather the reentry data for asparagus hand harvesting. In that case there would be no hand labor, no reentry exposure, and no need for data.

The Registrant has previously submitted protocols for field studies of potato and asparagus hand harvesting, they have completed the studies, and this potato hand harvest study has been found to be acceptable.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

A. MATERIALS AND METHODS:

The materials and methods employed by Orius Associates in this field study were realistic and appropriate to the intent of the research design. The use of chambray and denim rather than gauze patches, the use of cotton gloves rather than hand rinses, and the use of facial swabs are all appropriate and acceptable in this situation. Recoveries from the gloves and cloth were measured, and the reported residues have been corrected for a recovery of 73%.

B. REPORTED RESULTS:

The reported results were consistent with other studies of this type and very consistent with the same type of field study conducted on potato harvesters' exposure to dinoseb in Aroostock County, Maine.

C. STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:

The authors conclusions were supportable and within the constraints of the data, which was in turn defensible by the laboratory quality control measures that were in place throughout the study.

D. REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS

No detectable amount of linuron passed through the denim or chambray clothing to the skin; some passed through the cotton work gloves to the hands (4.71 +/- 1.17 ug) found in handrinses. The limit of detection for handrinse water was 3.75 ug/750 ml; therefore, the cotton gloves were used as the dosimeter to estimate rates of exposure and not the handrinse water.

The rates of hand exposure were estimated to be 2.07 ug/hour. This exposure could be reduced to 0.83 ug/hour if hands were minimally rinsed with water. Hand exposure could be reduced further if soap and water were used.

The data indicate that exposure of the face/neck is infrequent. But it must be included for a worst case analysis. Swabbing the faces and necks of hand-harvesters yielded an average of 0.22 - 0.31 ug of linuron residue in nine samples of 192 total samples. The residues represent an 88 cm (i.e. 4 x 22) area of the unprotected face and neck.

The unprotected areas of the neck front and back and the face are 150, 110, and 650 respectively for a total of 910 cm^2. So the worst-case exposure of those areas is:

$$\frac{910\ cm^2 \times 0.31\ ug/hour}{88\ cm2} = 3.2\ ug/hour$$

The fact that, out of 192 samples, residues were only detected in 9 samples with 8 of those positive samples from one individual indicates that facial residues probably don't occur unless the worker touches his face while working. Liberal use of soap and water would also reduce these residues.

The total of the facial [3.2 ug/hour] and the hand exposure [2.07 ug/hour] levels is 5.27 ug/hour with inhalation and body exposures at undetectable levels. This would be equivalent to 0.84 ug/Kg/day [5.27 x 8/50] for a 50 Kg [110 lb] child working 8 hours per day.

Good laboratory and field practices were observed; the appropriate quality control measures were employed; the study was conducted in accordance with the suggestions of Subdivision K of the Pesticide Assessment Guidelines, and the data is acceptable.

11. COMPLETION OF ONE-LINER:

Not applicable

12. CBI APPENDIX:

Not applicable